

Europäisches Patentamt  
European Patent Office  
Office européen des brevets



(11) EP 0 932 142 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:  
15.03.2000 Bulletin 2000/11

(51) Int. Cl.<sup>7</sup>: G10L 3/02

(43) Date of publication A2:  
28.07.1999 Bulletin 1999/30

(21) Application number: 99300462.1

(22) Date of filing: 22.01.1999

(84) Designated Contracting States:  
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE  
Designated Extension States:  
AL LT LV MK RO SI

(72) Inventor: Finn, Brian M.  
Madison, Wisconsin 53715 (US)

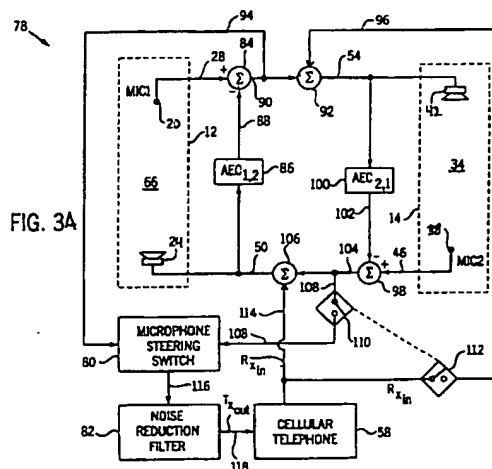
(74) Representative:  
Burke, Steven David et al  
R.G.C. Jenkins & Co.  
26 Caxton Street  
London SW1H 0RJ (GB)

(30) Priority: 23.01.1998 US 12529

(71) Applicant: DIGISONIX, LLC  
Madison, Wisconsin 53713-4644 (US)

(54) Integrated vehicle voice enhancement system and hands-free cellular telephone system

(57) An integrated vehicle voice enhancement system and hands-free cellular telephone system implements microphone steering techniques and noise reduction filtering to improve the intelligibility and clarity of transmitted signals. A microphone steering switch is provided for the cellular telephone interface which allows only one of the microphones to be switched in to an "on" state at any given time. The microphone steering switch generates a raw telephone input switch that is a combination of 100% of the designated primary microphone signal and approximately 20% of the microphone signals from microphones in the "off" state. In this manner, the telephone line does not appear dead to a listener on the other end of the telephone line when speech is not present in the telephone input signal. A noise reduction filter filters the raw telephone signal in the time domain in real time to improve the clarity of the telephone input signal when speech is present in the telephone input signal. A microphone steering switch for the voice enhancement system is also provided to implement switching between acoustically coupled microphones located within the vehicle.



EP 0 932 142 A3



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number

EP 99 30 0462

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A,D	US 5 706 344 A (FINN BRIAN M) 6 January 1998 (1998-01-06) * the whole document *	1,19,20	G10L3/02
X	---	21	
A	EP 0 789 476 A (TEXAS INSTRUMENTS INC) 13 August 1997 (1997-08-13) * the whole document *	1-16	
Y	---	24	
A	US 5 259 035 A (PETERS RICHARD W ET AL) 2 November 1993 (1993-11-02) * abstract *	1,33	
Y	US 5 574 824 A (SLYH RAYMOND E ET AL) 12 November 1996 (1996-11-12) * column 9, line 25 - line 68; figure 3 *	24	
A	WO 97 34290 A (ERICSSON GE MOBILE INC) 18 September 1997 (1997-09-18) * page 1, line 5 - line 19 * * page 11, line 14 - page 12, line 2; figure 3 *	24	
A	EP 0 640 953 A (CANON KK) 1 March 1995 (1995-03-01) * page 5, column 8, line 48 - page 6, column 10, line 15; figures 1-4 *	33	
A	PATENT ABSTRACTS OF JAPAN vol. 017, no. 470 (E-1422), 26 August 1993 (1993-08-26) & JP 05 111020 A (MATSUSHITA ELECTRIC IND CO LTD), 30 April 1993 (1993-04-30) * abstract *	33	
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>19 January 2000</b>	Examiner <b>Wanzeele, R</b>
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03/82 (P04Cat1)



European Patent  
Office

Application Number  
EP 99 30 0462

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



European Patent  
Office

**LACK OF UNITY OF INVENTION**  
**SHEET B**

Application Number  
EP 99 30 0462

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-23

Near-end and far-end echo cancelling, microphone steering  
and noise reduction filtering of echo-cancelled signals for  
voice enhancement.

2. Claims: 24-32

Noise reduction filtering of background vehicle noise

3. Claims: 33-37

Voice activated switching

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 30 0462

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-01-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5706344 A	06-01-1998	NONE	
EP 0789476 A	13-08-1997	JP 9307625 A	28-11-1997
US 5259035 A	02-11-1993	NONE	
US 5574824 A	12-11-1996	NONE	
WO 9734290 A	18-09-1997	US 5903819 A	11-05-1999
		AU 710617 B	23-09-1999
		AU 2208997 A	01-10-1997
		EP 0886852 A	30-12-1998
EP 0640953 A	01-03-1995	JP 7064578 A	10-03-1995
		JP 7334192 A	22-12-1995
		US 5764779 A	09-06-1998
JP 05111020 A	30-04-1993	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82